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SOME PSYCHOLOGICAL ASPECTS OF COMMITTEE WORK

DISSERTATION

PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN THE GRADUATE SCHOOL OF THE OHIO STATE UNIVERSITY

BY

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1927

Reprinted from THE JOURNAL OF APPLIED PSYCHOLOGY
Vol. XI, No. 5, October, 1927

SOME PSYCHOLOGICAL ASPECTS OF COMMITTEE WORK[1]

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INTRODUCTION

The committee is a perquisite of democracy. There was a time when the king, the owner of an industrial establishment, or the head of an educational institution or system made most of the necessary decisions. But today a goodly part of the world's deliberations takes place in committees. It is seldom feasible for an entire democratic group to consider and decide every issue. Hence the selection of smaller and even more wieldy groups to consider details and even make final decisions for the larger group which they represent.

This trend is well represented in current systems of national government. The democracy elects its various senators, members of parliament and whatnot to represent it. However these legislative bodies themselves are too large to weigh carefully each issue that arises. So we find the Committee on Foreign Affairs, the Committee on Appropriations, the Committee on Immigration, the Committee on Finance, etc., appointed to deal with special problems. In fact in the 69th Congress there were eighty-one official standing committees not counting numerous social committees.

Wallas, in his book "The Great Society" writing concerning the policies of the English government says:

> It is clear that a conscious psychological analysis of our social institutions, if it is at all widely undertaken, must ultimately lead to changes

[1] A second article by the same author will appear in the next issue of this JOURNAL. At that time the writer will discuss the sex of committees, whether or not a committee should have a limited amount of time in which to act, and the types of persons who serve best on committees.

both in the details of our representative and official Thought Organizations and in the spirit in which these organizations are worked. The first and most obvious of these changes would follow a consideration of the purely quantitative question as to the best size of deliberative assemblies. I believe that the size of many of our most important governmental bodies of English government could be reduced so as to secure more efficient deliberations.

Again in industry there is a trend toward giving the workers more of a voice in the management. But it is obviously impossible to assemble the entire clientele to decide numerous questions of policy so the task must be delegated to properly elected committees comprising perhaps both workers and managers. And even in academic circles the problems become too involved for the entire faculty to disentangle, so long suffering altruists take up as committees the burden laid down by the hoi polloi.

Now what do we find the committees doing? Their tasks run the whole gamut from the simple such as providing warm lunches for the employees to the complex such as determining the firm's policy as to employee's representation; from the concrete such as the effect of rest pauses on output to the abstract, the points which should be stressed in advertising the firm's product; from the trivial such as arranging for a company outing to the most profound as how can the firm best serve its customers in the future. Each of these tasks requires the speedy and accurate performance of competent committeemen in order that the organization represented may prosper.

Now how do we find committees doing their work? In a great variety of ways. Some have a definite plan of procedure while others work more or less at random. In some cases the chairman is aggressive and in other cases he merely records the decisions of the group. Some committees meet around the lunch table; others in the office. Some are limited as to time because members have subsequent engagements and other committees have unlimited time. Obviously there are wide differences in procedure.

We naturally think in this connection of the problems of

group behavior versus individual behavior. Burnham,[2] Moede[3] and Allport[4] and other experimenters have showed that persons in a group act differently from isolated individuals. There are so many possibilities of stimulation by other members of the group that it is harder to predict what a given individual is going to do. The writers mentioned above found for instance in various types of experiments that there was a marked effect due to motivation and that this effect was in proportion to the size of the group.

But studies such as these shed only a dim light on the large problem of committee efficiency. The usual committee is not a mere group doing collectively what each individual member could do equally well alone if properly motivated, but is discussing and arguing back and forth with a great deal of mutual interstimulation. Some psychologists whose lot it has been to serve on numerous committees have been impressed by the fact that often there is a great deal of lost motion involved. This is particularly noticeable when one has had contact with a variety of committees. Some committees seem to go direct to their destination while others go from New York to Boston by way of Chicago or Hudson Bay. Some even go into blind alleys and sleep. Some are a tremendous success socially but not otherwise. And it is fortunate that some are effective from both the standpoint of speed and accuracy. Wallas says:

> I have myself during the last twenty-five years sat through perhaps 3000 meetings of municipal committees of different sizes and for different purposes and I am sure that at least one half of the men and women with whom I sat were entirely unaware that any conscious mental effort was called for on their part. They came much in the same manner as they went to church, with a vague sense, that is to say, that they were doing their duty and that good must come of it.

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[2] Burnham, W. H. The group as a stimulus to mental activity. Science, 1910, 31, 761.

[3] Moede, W. Experimentelle Massenpsychologie Beitrage zur Experimentalpsychologie der Gruppe. Leipzig, 1920.

[4] Allport, F. H. The influence of the Group upon association and thought. Journal of Experimental Psychology, 1920, 7, 159–182.

But why these differences? We have here a challenge for the scientist. This is an age of efficiency. We motion study our workmen in industry and reduce the operations of laying brick from 18 to 5.

It is impossible to estimate how much of the world's time and energy is wasted in ineffective committee work. We do not notice the loss because we do not apply time study, cost accounting and all the rest to the committee's job. We do not "fire" a man for being a poor committeeman and we do not "fire" the committee except in extreme cases. But the loss must be tremendous and even a modest gain in the efficiency of every committee would in its cumulative effect be very large. The congressmen could have more golf, the industrial worker or business man more time to dig in his garden and the professor more time to play bridge.

The present research proposes to make a beginning on the problem of improving the effectiveness of committee performance. Obviously we cannot solve the whole matter at once. It is necessary to anaylze it into a number of discrete problems. Some of these are rather obvious such as size, sex, general intelligence of the group, influence of authority, conventional versus unconventional, influence of time limit, and many other factors. It would be a lifetime's job to solve all the committee problems that have a psychological angle. It has been necessary in the present study to concentrate on a few of the salient ones such as the following:

1. What is the best size for a committee? Is a committee of three more efficient than a committee of six?
2. How is the sex factor related to committee efficiency? Should committees be all of one sex or should they be composed of both sexes? Is there any relation between sex and the type of work the committee can most effectively perform?
3. Should the committee have a definite amount of time in which to act or should there be no time limit?
4. Are there certain types of individuals who can work more effectively on one kind of committee problem than on another? Should a committee be preferably homogeneous as far as type of individual is concerned?

A statement of the method and a description of the materials used in attacking the above problems will now be given.

MATERIAL AND METHOD

In selecting the material for this experiment we had in mind the range of problems with which committees deal in practical life and effort was made to get procedures which would cover a similar range. Consequently several types of material were selected, ranging from the concrete to the more abstract. As suggested it was possible to try only a limited number of approaches and to choose some that were widely different and still typical of practical committee performance.

While the effect of practice with these materials subsequently proved to be rather slight, still whenever it was technically possible a practice series was used in order to get the subjects acquainted with the type of experiment to be performed. In most cases the material was divided into two series of approximately equal difficulty. This was done by preliminary experiments where the actual time for each photograph or problem was recorded. In arranging the two series care was taken to divide the photographs or problems into series so that the total time for each series would be practically the same. Thus the practice effect, if any, could be determined by comparing the performance on the second series with that on the first.

The results were generally scored in two ways: First, on the basis of the accuracy of the performance; and, second, on the time required to complete the experiment. In practical life we are concerned both with the rapidity of the committee's action and also with the quality of its report.

Four types of material were used:

1. Photographs Portraying Emotions
2. Multiple Choice Problems
3. Bridge Problems
4. Judging English Compositions

These four types of materials and the methods used in each case will now be described in detail.

PHOTOGRAPHS PORTRAYING EMOTIONS

Ever since the time of Charles Darwin investigators have been interested in facial expression as related to emotions. Such experiments can be conducted quite conveniently by the use of photographs. Though it is highly improbable that permanent mental characteristics such as intelligence, neatness, sociability, etc., may be judged with accuracy from facial contours and expressions, it would seem that such temporary conditions as emotions which involve definite movements of facial muscles may be so judged. The writer holds no brief for the so-called "sciences" of phrenology and physiognomy,—they deal with permanent rather than temporary aspects of one's appearance.

This material was selected for use in the present study because it yields a rather personal type of situation for the committee and also because it has been used with fair accuracy by other experimenters. Feleky[5] in 1914 conducted an experiment in judging emotions from photographs. The procedure was as follows: Several hundred photographs of the same individual were taken at different times during a period of one year. As the individual posed for each photograph she had definitely in mind the type of emotion she was trying to portray. Feleky selected eighty-six of these photographs and presented them to one hundred reliable persons as judges. The photographs were numbered. Each judge received a sheet of paper with a list of numbers similar to those on the pictures and also a sheet with a list of 110 emotions to aid him in selecting the proper ones for the photographs. By this method Feleky selected the 24 photographs upon which there was the most agreement. Langfeld[6] and several other experimenters have carried on similar experiments of this kind and their results tend to corroborate those of Feleky.

[5] Feleky, A. M. Emotions from photographs. Psychological Review, 21, 1914, 33–41.

[6] Langfeld, H. S. Judgment of emotions from facial expressions. Journal of Abnormal Psychology, 1918, 13, 172.

The writer used the twenty-four photographs from the Feleky experiment. They were about 3 inches by 3 inches and were mounted on grey cards 4.5 inches by 4.5 inches. The photographs were placed in random order on the table before the subjects, care being taken, however, not to have two similar photographs adjacent. The subjects were given mimeographed sheets containing the following directions and list of emotions:

Examine the following list of emotions carefully. From the photographs arranged on the table choose a photograph that portrays each emotion listed. Use each photograph only once. Take the emotions in the order listed and do not skip around. You are to work as a committee. Talk over each selection among yourselves. After you have come to a decision in each case, note the (printed) number on the back of each photograph and have the chairman record the group's choice on his blank. A majority vote is necessary to select a picture. After you have finished making your choices write a brief introspective account concerning your own feelings, difficulties, etc., during the experiment. Report any details which you consider would be helpful to the experimenter.

Horror	Religious feeling
Vanity	Despair
Interest in a child	Breathless interest
Fear	Sneer
Rage	Suspicion
Laughter	Modesty
Disgust	Determination
Pity	Mental multiplication
Faint suspicion	Righteous anger
Contempt	Physical pain
Hate	Sympathy
Agreeable surprise	Attention to an object

In some parts of the experiment all twenty-four photographs were used as one series while in other parts of the experiment they were divided into two series of twelve photographs each. This division was necessary when practice effect was to be considered or when one wanted to show the effect of time limit on the committee's performance. In arranging these two series the first column and the corresponding picture was called series A, while the second column was called series B. Care

was taken not to have two similar emotions such as suspicion and faint suspicion in the same series.

This experiment was scored on the basis of the number of photographs selected correctly according to the Feleky standard and also on the basis of the total time required for the operation.

MULTIPLE CHOICE PROBLEMS

The multiple choice method was selected because it seemed to represent a highly abstract type of problem in contrast with other types of materials used in this experiment. This method was first used by Hamilton[7] and later by Yerkes,[8] Burtt,[9] and others on mammals. Yerkes subsequently adapted the apparatus to use with the human subject. It was this latter type of apparatus that was used in the present experiment.

Yerkes' method consisted in presenting to the subject a bank of twelve wooden keys, 1 inch by 3 inches. These could be drawn back within the apparatus or any desired number could be presented for the subject to operate. They might, for instance, be presented with two keys at the extreme left, five near the center or even the whole twelve. Each group of keys presented was termed a "setting." The subject was told that the pressing of one key in the group presented would yield the desired effect, such as the ringing of a buzzer. In each series of settings the same principle regarding the successful key was involved. For instance it might be that the second key from the left end of the setting always rang the buzzer. The subject was told to attempt to press the correct key in each trial and also to state the principle involved as soon as he had discovered it.

The directions which the writer used were very similar to those of Yerkes except that they were designed for a group

[7] Hamilton, G. V. A study of trial and error reactions in mammals. Journal of Animal Behavior, 1911, I, 33.

[8] Yerkes, R. M. A study of human behavior. Science, 1914, 39, 625–633; A new method of studying ideational behavior. Journal of Comparative Psychology, 1921, I, 369–394.

[9] Burtt, H. E. A study of the behavior of the white rat by the multiple choice method. Journal of Animal Behavior, 1921, 6, No. 3, 222–46.

experiment and not for individual experimentation. Nine problems were used. A sample of these problems is given below. The principle or rule is given in brackets. The figures in the column headed "setting" indicate the keys which were pushed out for the subjects to operate. For instance the first setting on the first problem used keys 6 to 12 inclusive, and if the chairman of the group pressed 6 the buzzer sounded.

PRACTICE PROBLEM (FIRST KEY ON LEFT)		PROBLEM I (MIDDLE KEY)	
Settings	Correct key	Settings	Correct key
6–12	6	1– 7	4
11–12	11	10–12	11
3–11	3	6–10	8
1– 5	1	1–11	6
4–11	4	1– 3	2
10–12	10	4–10	7
5– 9	5	1– 9	5
2–12	2	9–11	10
8–11	8	1– 5	3
7–12	7	6–12	9

These problems were selected from the ten problems Yerkes suggested to be used in testing human subjects. The eight problems were arranged in such order that two series could be used,—problems 1, 3, 5, and 7 composing series A and problems 2, 4, 6, and 8, series B. A more simple introductory problem was used in each case in order to orientate the group before presenting the regular series. In recording the results on this type of material two scores were used,—one the total number of keys pressed before the principle involved was discovered, and the other the total time required for the solution.

BRIDGE PROBLEMS

The third kind of material selected for use in the committee experiment consisted of bridge problems. In each instance a few cards remained in each hand and the problem was for a

designated team of players to play in such a way as to take a specified number of tricks. Eleven problems were used in all,—some from Work's[10] book on Bridge Problems and the rest made up by the writer. They were arranged in two series, A and B, of five problems, with one extra problem to be used for practice. In making up the two series care was taken to get problems of about the same difficulty and those in which there was but one solution according to the best rules on bridge playing. This was done in preliminary experiments with quite a large number of players of various degrees of ability, each player solved the problems individually and in addition to having the time recorded was required to rate each problem as to its relative difficulty. Only those problems which could be solved by the player of average ability were adopted. The following is a sample of the type of material:

North

Spades
Hearts J–8
Diamonds J–9
Clubs A–10–9–5

	Spades Q–9	Spades
	Hearts K–10–3	Hearts Q–6–5–2
West	Diamonds	*East* Diamonds 5
	Clubs 7–4–3	Clubs K–8–6

South

Spades
Hearts A–9–4
Diamonds Q–8
Clubs Q–J–2

Problem: North and South no trump bid; South's lead; must take 6 of the 8 remaining tricks

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[10] Work, M. C. Auction Bridge. John C. Winston Company, 1926, pp. 475.

The following directions were given the group of subjects:

This experiment deals with committee work and introduces a series of bridge problems. You need not be an expert player in order to take part. On the table you will find the hands of various players. A number of tricks have been played. Assume that every player knows every card remaining in the hands. You will be required to work out a system of plays by which the bidder may take a certain number of the remaining tricks (say 4 out of 5 for example). In most cases the problems have been so arranged that there is only one correct solution. There are six problems in the series (the first being for practice). Each problem requires a different type of solution. You are to work as a group, everybody aiding in the solution. When you have reached a solution one member will put it in writing. When you have finished and have your solution to each, report same to the instructor in charge before starting the next problem.

The results with this type of material consisted of the time required to solve the series. The subjects always continued until they reached the correct solution. Inasmuch as the order of plays might vary somewhat in reaching the same solution an accuracy score was not feasible. However, the experimenter was careful to require a satisfactory solution to each problem before recording the time.

GRADING ENGLISH COMPOSITIONS

The fourth type of problem given the subjects in this experiment on committee work was making judgments of quality on a series of English compositions. Thorndike[11] in 1916 gathered together one hundred and fifty selections of English composition written by students of various ages and abilities. These were divided into three groups according to the following subject matter:

1. Common Sense (a paper published by Thomas Paine).
2. Deep Haven (the description of a New England fishing town).
3. English Compositions (written on various subjects).

There were 100 compositions of the first group, 18 of the second and 32 of the third.

[11] Thorndike, E. L. English Composition; 150 specimens arranged for use in Psychological and Educational Experiments. Teachers college, 1916.

Thorndike had a large number of teachers rate these selections as to their merits on the basis of general value. He used the median of the range of ratings on each composition as the score or value. The writer picked two series A and B of five selections each from the three types of subject matter,—30 selections in all. Using the value given to the selections by Thorndike as an index of their difficulty, effort was made in each case to keep the two series equal in total difficulty and to avoid the space error. Thus in series A of any set, if the selection which was given the highest rating by the Thorndike raters was placed at the beginning of the list, in series B, the corresponding selection which should likewise receive the highest rating, was placed farther down on the list. Practice effect could also be taken care of by having two series of equal difficulty and inverting the order in different experiments.

The following directions were given the subjects working on the experiment:

> This is an experiment in committee work. Here are some samples of English composition. You are to work together as a committee and rate them as to their values as compositions. Put the selection you consider best first, the composition you consider the next to best second, etc. Read them over carefully and indicate when you have finished reading so that your chairman can call for a vote as soon as all have finished. Do not be *over* critical concerning spelling or grammar as these compositions were written by students of all ages, but rate them on the basis of their general content and expression.

The results were based on both accuracy and time. As an index of the former the ranking given by the committee was correlated with the correct ranking as assigned by Thorndike's raters, using the rank difference formula. The correlation coefficient thus gave an indication of the correctness of the committee's judgment. The time taken to complete the ranking was the other score considered.

SUBJECTS

There were 1312 subjects used in this experiment. The majority of these were enrolled in courses in Psychology at the

Ohio State University. Some of them served in more than one group but in no case was such an individual put through the same set of material twice. Most of the subjects participated only once. Over 50 per cent of the 1312 subjects were of Freshman or Sophomore rank. The ages ranged from fifteen to thirty years, the median age being twenty years. We find that 50 per cent of the group range from nineteen to twenty-one years of age. Most of the subjects used in this experiment had taken the Ohio State University Intelligence Test and their scores showed that they ranked somewhat higher in intelligence than the average group.

RESULTS: THE SIZE OF COMMITTEES

Committees vary greatly in size. Some are composed presumably of entirely too many members and thus are unwieldy, while others may consist of too few members to contribute adequately to the solution of the committee's problem. The first fundamental question undertaken in this experiment was to determine the influence of size of a committee upon its efficiency. Groups of three and groups of six subjects were selected to participate in the various types of experiment. There was no particular reason for selecting groups of exactly these sizes except that they seem to be fair examples of small and of large committees. Both male and female groups were used so that the influence of sex might also be considered. There were 252 males and 198 females used in this experiment.

The material used in the experiment consisted of the four types as mentioned earlier in this paper; viz. Photographs Portraying Emotions, Multiple Choice Problems, Bridge Problems, and Judgments of English Compositions. As the materials in each case were divided into two series,—series I and series II,—practice effect could be controlled. This was determined by selecting paired groups, comparable in size and sex,—for instance, if a group of females without practice was used a group of females with practice was also included. The average for all such groups with practice was then compared with the average time for the paired groups without practice. The per

cent superiority of the former to the latter gave a general index to the effect of practice with that particular type of material. This was done for all four types of material. Groups of six subjects were selected (for example A, B, C, D, E, and F). Subjects A, B, and C as a group tried series I, then all six tried series II, and then the other three tried series I. Several groups were put through in this order then other groups were used in the reverse order. The number of groups used was such that in the case of the smaller groups there was about the same number of groups with practice as those without practice. It should also be noted that a part of the larger groups of six members always had a chance to become orientated by having done a previous series when serving in a group of three.

The responses of the groups were scored on the basis of accuracy and also on the amount of time necessary to complete a satisfactory solution of the problem in hand.

Let us now consider the results. Using series I of the Photographs Portraying Emotions we find the average time for the small male groups is 147 seconds with 8 photographs correct while the larger male groups take 195 seconds and get 9 photographs correct. When we examine the results for the male groups on series II the small groups take 203 seconds with 7 photographs correct while the large groups take 159 seconds and get 7 photographs correct. We may assume series I and series II to be of approximately equal difficulty because preliminary experiments were tried in which this was found to be the case (see section on methods and materials). We find the average time for all 12 groups of three males each is 170 seconds with 7 photographs correct, while the 6 groups of six males each average 182 seconds with 8 photographs correct. The larger groups are slower and slightly more accurate.

On series I of the same materials the groups of three females each average 179 seconds with 8 photographs correct while the large groups of 6 females each use 215 seconds and get 6 photographs correct. On series II the small groups of females average 142 seconds with 8 correct while the larger groups average 197 seconds with 7 photographs correct. The larger groups are in

this case inferior both in speed and in accuracy. If we consider all groups of females on both series together the small groups average 157 seconds with 8 photographs correct and the larger groups average 208 seconds with 7 correct. This tends to show that the smaller groups of females work faster and are more efficient than the larger groups.

If we consider all the results for both males and females on other series I and series II the average for the 22 groups of 3 members each is 171 seconds with 8 photographs correct and for the 11 groups of 6 members each is 191 seconds with 7 photographs correct. The average intelligence rating for both the small and large groups is 50; so the difference in efficiency is not due to a difference in intelligence.

This indicates that the smaller groups are quicker and on the average as accurate, sometimes even more accurate, than the larger groups. This is true in both male and female groups. When we find the ratio of the difference between the two averages to its probable error we have 2.9 for the time and 2.7 for accuracy.

Let us now consider the results obtained by using the second type of material; namely, the Multiple Choice Problems. It was necessary to use different subjects in this experiment. The general plan of procedure was identical with that previously discussed. The problems were arbitrarily numbered from 1 to 8 and alternate problems used to make up two series.

On series I the groups of 3 males use on the average 40 keys and take 172 seconds while the groups of 6 males on the same series use 37 keys in 154 seconds. On series II the groups of 3 males use 45 keys in 200 seconds; the groups of 6, 43 keys in 162 seconds. Since series I and series II are of practically the same difficulty we may combine the results on both series. The groups of 3 males average 43 keys in 186 seconds while the groups of 6 males average 40 keys in 58 seconds. Thus with the males it seems that the larger groups are more accurate and take less time.

The female groups of 3 members each use 44 keys and require 220 seconds in solving series I while the larger groups use 30

keys in 124 seconds. On series II the smaller female groups use 55 keys with 230 seconds while the larger groups use 37 keys with 227 seconds time. Considering series I and series II together the 10 groups of 3 females each average 49 keys in 225 seconds while the groups of 6 females average 33 keys in 175 seconds. Again on this type of material the results show that the larger groups are more efficient.

When we combine the results of both the males and the females on series I the small groups use on the average 43 keys with 202 seconds, while the larger groups use 34 keys and 142 seconds. On series II the smaller groups use 51 keys and 209 seconds, the large groups 41 keys and 188 seconds. Now if we combine all groups disregarding sex and series we find that the 16 groups of 3 members each score 42 keys and 210 seconds, while the 10 groups of 6 members each used 37 keys and 165 seconds. The practice effect in the Multiple Choice Problems shows 16 per cent increase in speed with no gain in efficiency. When we find the ratio of the difference between the two averages to its probable error we have 2.7 for the keys or accuracy and 2.0 for the time or speed. This gives a probability of 97 chances out of 100 that a real difference exists for accuracy and 91 chances out of 100 for speed. The average intelligence rating for the small groups is 56 while the large groups have an average rating of 48. This difference in intelligence probably is not enough to introduce an error into the experiment. In fact the more efficient groups are slightly inferior in intelligence.

These results seem to show that the larger groups are quicker and more efficient than the smaller groups. We must not fail to consider however the type of problem given the committee in this case, in comparison with the other materials used. The solution of the Multiple Choice Problems is very different, for instance, from the selection of photographs portraying certain emotions. In the latter case each member of the group has his own opinion of how an enraged person should appear, and a small group seems more effective in pooling these individual opinions. In the Multiple Choice Problems each member of the group adds his part to the solution and tries to help the

group evade the unsuccessful key. In this case there is greater chance for interstimulation and it may be that the larger the group the more speedy and accurate are the reactions. Brief judgments may be good on photographs for deliberation seemed to lead generally to much argument without much gain in accuracy. In the Multiple Choice Problems the group is constantly checking a theory and the argument is usually to the point. It is a case of trial and error with ideas and the more ideas available for trial the better. Each member tries to help avoid the unsuccessful keys and to eliminate the theories which are not successful and to suggest new principles which may be correct.

Let us now turn to the results obtained by the use of the third type of material, namely, the Bridge Problems. Again the individuals used in this part are not the same subjects used in the other parts of this experiment. The previous plan of using groups of 3 and of 6 members was followed. Ten problems were used, being divided into two series of equal difficulty as mentioned in a previous section of this paper. The practice effect with this type of material shows that groups with practice are only 15 per cent faster than those without practice. The groups of 3 males doing series I have an average time of 840 seconds in solving the 5 problems, while the groups of 6 males average 426 seconds. On series II the smaller groups average 569 seconds, the larger groups, 528 seconds. When we consider the result of both series the 12 groups of 3 males each have an average of 683 seconds and the groups of 6 males have an average of 477 seconds. This is in favor of the larger groups. The reader will recall that this bears out our findings with the Multiple Choice Problems.

The female groups composed of three members each on series I average 817 seconds while the groups of 6 members each average 1385 seconds. The smaller groups have an average intelligence score of 45, the larger 61. This is a comparatively slight difference. One of the problems in this series seemed to be much more difficult for the females than the other problems and this may account for the average of the female groups being so high.

On series II the smaller groups of females average 792 seconds and the larger groups 510 seconds. When results from both series I and series II are combined the 8 groups of 3 females each have an average time of 804 seconds and the 4 groups of 6 females each take on the average 948 seconds. The average intelligence of the smaller group is 49 and of the larger group 48.

If we now examine the combined results of male and female groups on series I the 10 groups of 3 members each average 835 seconds, the 5 groups of 6 members each, 809 seconds. In series II the 10 groups of 3 members each average 667 seconds, the 5 groups of 6 members each have an average time of 521 seconds.

Combining the entire results from series I and series II male and female groups the 20 small groups average 746 seconds, the 10 large groups 665 seconds. When we find the ratio of the difference of the two averages to its probable error we get 1.1. The average intelligence of both the large and small groups is 53 so the factor of intelligence need not be considered. The difference in time in favor of the larger groups is probably due to type of material. However, the female groups do not show this general trend so much as the males, and in one series actually reverse it. It may be that they are more closely connected with the Bridge situation in their social activities. In observing these groups of subjects the experimenter noted marked difference in the general attitude of the players as far as sex was concerned.

The experimenter observed that in the male groups each member seemed to try to figure out a solution for himself. A different type of activity was observed in the female groups. Each member would offer her suggestions concerning the plays and then some other member would tell what difficulty would be encountered by so playing. There was much activity and exchange of views. The experimenter felt that the females were much less accurate. Accuracy scores were not taken however for the subjects, inasmuch as each group was required only to arrive at a satisfactory solution to the problem, although the order of plays might vary somewhat.

In conclusion it would seem that this difference in favor of the larger group is due to the type of situation which the Bridge Problem presents and that the difference is greater in the case of the male groups than in the female groups. These conclusions seem to corroborate the results of similar groups on the Multiple Choice Problems, although the difference is not quite so significant in this case. In both the Multiple Choice Problems and in the Bridge Problems we have an abstract type of situation. In both cases the groups are trying to find a principle which is involved. This principle does not represent anything that is personal to them, perhaps nothing even which they have experienced in quite the same way before. The other types of materials seem much more personal and concrete and individual opinion is paramount. With abstract material the factors added by each member of the group are especially helpful in arriving at a solution; hence the effectiveness of the larger group.

The fourth type of material used in the experiment on the size phase of the committee problem was Judging the Value of English Compositions. The subjects used in this section were not the same as those used in the previous experiments with the other types of material. The general procedure of using groups of 3 and 6 members each was the same as previously described. The groups of 3 males each in solving series I have an average accuracy of 0.33 with 1063 seconds time while the groups of 6 males score 0.64 with 1718 seconds time. On series II the small groups have an accuracy score of 0.6 with 688 seconds while the large groups have an accuracy score of 0.83 with a time of 1208 seconds. When the results of both series are combined the small groups average 0.47 in accuracy and 875 seconds in time while the large groups average 0.73 in accuracy with 1487 seconds time. The larger groups are much slower but considerably more accurate.

Considering the females' groups on series I, the groups of 3 members each have an accuracy of 0.65 with 826 seconds time while the groups of 6 have an accuracy of 0.4 with 1361 seconds time. On series II the small groups have an accuracy score of

0.59 with 625 seconds while the larger groups average 0.7 in accuracy with 864 seconds time. Combining the results of series I and series II the small groups have an accuracy score of 0.63 with 759 seconds, the large groups 0.60 with 1029 seconds time. The larger groups of females are much slower with practically the same accuracy as the smaller groups.

When we combine the results for both male and female groups on series I the average accuracy of the small groups is 0.4 with 958 seconds time and for the large groups 0.56 with 1599 seconds time. Combining the results for the male and female groups on series II the small groups average 0.61 with 670 seconds while the larger groups average 0.76 with 1061 seconds time.

When the results for both series I and series II male and female groups are combined the average for the 16 groups of 3 members each is 0.49 for accuracy with 831 seconds time and for the 7 groups of 6 members each is 0.68 for accuracy with 1291 seconds time. The smaller groups taking 460 seconds less time are only 0.19 less accurate. When we find the ratio of the difference between the two averages to its probable error we have 4.7 for the time and 3.5 for the accuracy. Obviously both these differences are statistically significant. When we consider the effect of practice as computed before we find that the groups with practice are 32 per cent quicker and only 23 per cent more efficient. This is not a great difference.

In general these results show rather consistently that the small groups are quicker and not significantly less accurate than the large groups. This is similar to the results with the photographs and probably due to the same factor.

CONCLUSIONS

1. The size of a committee has much to do with its efficiency. In each of the four types of materials used in this problem on size there was quite a difference between the performance of groups of 3 and groups of 6.

2. This difference is somewhat dependent on the type of material or the kind of problem given the committee. In the

four types of problems used the small groups were more efficient on the Photographs Portraying Emotions and on the Judgments of English Compositions, while with the other two types of materials,—Multiple Choice Problems and the Bridge Problems the larger groups did better. This difference seems to be due to the difference between the abstract and concrete materials. The situation was such that no one had preconceived opinions but the problem was developed upon the committee's hands. The attitude of the subjects was essentially constructive and each member contributed something additional. In the previous experiments with the Photographs Portraying Emotions and the Judgments of English Compositions, however, the members had their own opinions after the first glance and the committee's task was largely that of compromising or overriding opinions. In this case the smaller group had less of this compromising and overriding to do and hence was more expeditious with no loss in accuracy.

3. The sex of the groups is another factor to be considered as far as size is concerned. On the abstract type of material the larger groups of females are better while on the concrete material there is not so much difference. The larger female groups profit more by the mutual interstimulation than the larger male groups.

4. In the subjects used in this experiment it did not seem that the factor of intelligence played an important part in obscuring the other variables that were under investigation.

Reprinted from THE JOURNAL OF APPLIED PSYCHOLOGY
Vol. XI, No. 6, December, 1927

SOME PSYCHOLOGICAL ASPECTS OF COMMITTEE WORK[1]

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INTRODUCTION

Today a large part of the world's work is carried on by committees. It is seldom feasible for an entire democratic group to consider and decide every issue; hence the selection of smaller and more wieldy groups to consider details and even make final decisions for the larger group which they represent. This trend is well illustrated in national government, in industry and in academic circles.

What do we find these committees doing? Their tasks run the whole gamut from the simple to the complex; from the concrete to the abstract; from the trivial to the profound. How do we find these groups doing their work? In a great many ways. Some have a definite plan of procedure while others work more or less at random. Some committee meetings are formal others very informal. Studies to date shed only a dim light on committee efficiency. This is an age of efficiency yet the technique of efficiency procedure has not been adapted to the problem of committee procedure.

There are a great many problems involved but the writer has selected the following four typical phases:

1. What is the best size for a committee?
2. How is the sex factor related to committee efficiency?
3. Should the committee have a definite amount of time in which to act or should there be no time limit?

[1] The first installment of this article was published in the October, 1927, issue of the JOURNAL.

4. Are there certain types of individuals who can work more effectively on one kind of committee problem than on another?

MATERIAL AND METHOD

In selecting the material for this experiment an effort was made to select problems similar to those which the committee would have to solve in practical life. Consequently several types of material were selected, ranging from the concrete to the more abstract. While the effects of practice with these materials subsequently proved to be only slight still whenever it was technically possible a practice series was used in order to get the subjects acquainted with the type of experiment to be performed. In most cases the material was divided into two series, Series I and Series II, which were of approximately equal difficulty. This was done by preliminary experiments where the actual time for each photograph or problem was recorded. In arranging the two series care was taken to divide the photographs or problems into series so that the total time for each series would be practically the same. Thus the practice effect could be determined by comparing the performances on the two series.

The results were scored in two ways,—first, on the basis of the accuracy of the performance and second, on the time required to complete the experiment. In practical life we are concerned both with the rapidity of the committee's action and the quality of its report. Four types of material were used:

1. Photographs Portraying Emotions
2. Multiple Choice Problems
3. Bridge Problems
4. Grading English Compositions

Investigators have long been interested in facial expression as related to emotions. Although it is highly improbable that permanent mental characteristics such as intelligence, neatness, sociability, etc., may be judged with accuracy from facial contours and expressions, it would seem that such

temporary conditions as emotions which involve definite movements of muscles may be so judged.. This material was selected because it yields a rather personal type of situation. The photographs used in this experiment were the same as those used by Feleky (1). These photographs were placed in random order on the table before the group and the subjects were required to select pictures which portrayed certain emotions as specified on a mimeographed list which had been given to them.

The Multiple Choice apparatus and the problems used were similar to those used by Yerkes (2).

The Bridge Problems were similar to those found in Work's (3) book on Auction Bridge.

The English Compositions were selected from those used by Thorndike (4).

There were 1312 subjects used in this experiment. Over 50 per cent of the group were of Freshmen or Sophomore rank. Their ages ranged from fifteen to thirty years with a median age of twenty. The group of subjects ranked higher in intelligence than an average group.

In a recent number of this JOURNAL the writer (5) discussed the influence of the size of a committee upon its efficiency. The following conclusions were drawn.

SIZE OF COMMITTEE

I. The size of a committee has much to do with its efficiency. The difference in performance according to size depends somewhat on the type of problem which the group has to perform. The smaller groups are more efficient on the personal type of problem,—the Photographs Portraying Emotions and the Judging of English Compositions. In this type of problem each individual forms his own personal opinion at the outset and when the groups are small there are fewer such personal opinions to be reconciled than when the group is large. In the case of the Multiple Choice Problems and the Bridge Problems, two examples of abstract and impersonal kinds of material, the larger groups are better. In these

types of problem no one comes with a preconceived idea, but each member contributes then and there to the solution. The many ideas or suggestions contributed by the members of large groups seem to aid in the solution of the abstract problem but to slow up the progress on the personal type of problem.

II. The size factor is still further influenced by sex. On the abstract material the larger groups of females are better while on the concrete there is not so much difference. The larger female groups profit more by mutual interstimulation.

Let us now consider the other phases of the problem namely, sex, effect of a time limit, and the types of persons who serve on committees.

SEX OF COMMITTEES

Should committees be composed of members of the same sex only? Is there any relation between sex and the type of work the committee can perform most effectively? Other studies have shown slight sex differences in efficiency but have suggested larger differences in attitude and interest. It seemed possible that such differences might be discovered in the present experiment.

The four types of material mentioned above were used in this experiment on sex. There were 322 males and 281 females who served as subjects in the experiment. In most instances groups of 4 males, 4 females, or mixed groups consisting of 2 males and 2 females participated. In a few cases groups of 3 members and groups of 6 members each were used. The results are found in table 1. In the case of the groups working on all 24 of the photographs as a single series the male groups are quicker but less accurate than the female groups. The mixed committee is quicker than the male or female groups and its accuracy is only slightly better than the males. This would suggest that if we are interested more in accuracy than in speed mixed groups are not quite so desirable as groups of one sex.

It was possible to get other data on the question of sex by making comparison of male, female and mixed groups when

TABLE 1*

Photographs Portraying Emotions

	MALE		FEMALE		MIXED	
	Time	Number correct	Time	Number correct	Time	Number correct
Groups of 4 members using all 24 photographs						
	seconds 1,335	11	*seconds* 1,469	17	*seconds* 1,230	13
Groups of 4 members working "ad lib"						
Series I	190	9	229	8	180	8
Series II	223	7	322	8	273	10
Average	206	8	275	8	226	9
Groups of 4 members working with a time limit						
Series I	141	8	124	7	121	8
Series II	112	8	184	7	127	8
Average	126	8	154	7	124	8
Groups of 3 members working "ad lib"						
Series I	147	9	180	8		
Series II	203	9	134	8		
Average	175	9	157	8		
Groups of 6 members working "ad lib"						
Series I	195	9	217	7		
Series II	159	7	197	7		
Average	177	8	207	7		

* All figures quoted in tables are averages of group performances taken from larger tables in original experiment.

they were given all the time they wanted to solve a series of the photographs and also when a definite time limit was placed on their actions. Results for such groups working with both Series I and Series II are shown in table 1.

When we compare the groups working "ad lib," we find the males take 206 seconds with 8 photographs correct, the females 275 seconds with 8 correct, the mixed 226 seconds with 9 correct. In the above data with no time limit the results favor the males on speed and the mixed groups on accuracy. However the males are only slightly less accurate and a little quicker.

The results for similar groups on both series when a definite time limit has been announced show that the females average 154 seconds with 7 correct, the males average 127 seconds with 8 correct, and the mixed average 124 seconds with 8 correct. These results show the male groups are 12 per cent quicker than the female and mixed groups are 1 per cent quicker than the male and 19 per cent quicker than female. There is very little difference in accuracy. However the mixed groups are as accurate as the males and 12 per cent more accurate than the females. The mixed groups seem to be the most efficient. Since the practice effect with this type of material was only 9 per cent in time and 2 per cent in accuracy, it does not play an important rôle here and the time limit is the real causal factor.

Results for groups of 3 members are shown in the next section of table 1. Considering results of Series I and Series II together the groups of 3 males take on the average 175 seconds and get 9 photographs correct while the groups of 3 females take 157 seconds with 8 photographs correct. Comparing male and female groups of 3 members each indicates that the males are slightly more accurate than the females, the latter being a little quicker. This may be due somewhat to the fact that this type of material may be easier for the females than the males because of its being more personal and closer to their own experience and interests.

When we examine the results for the groups of six members

each as shown in the table we find that when we combine results for Series I and II the male groups of 6 members take on the average 177 seconds and get 8 photographs correct while the females average 207 seconds with an accuracy of 7. The small female groups are slightly superior to the male groups and the large female groups are inferior to the large male groups in their performance on this type of material. This latter tendency was also noted in our discussion of size of committees. In that case we found that the larger groups were inferior in judging the photographs and that this trend was greater in the case of females than males.

Let us consider the sex variable using the second kind of material, viz., the Multiple Choice Problems. The results are shown in table 2. In experimenting with some of the groups the entire 8 problems were used as one series. The groups of 4 males on an average use 599 seconds and 86 keys in solving the eight problems, the groups of 4 females 466 seconds and 98 keys, and the mixed groups 655 seconds and 106 keys. Considering the average results for these three types of groups the males are more accurate and slower than the females, who take more keys and less time, suggesting that the females react more quickly to the situation and profit less by their pressing the wrong key. This probably causes the marked difference in results when we look at the averages for the mixed groups. In this case the mixed group takes both more keys and more time. It seemed to the writer in his observation of the groups that the Multiple Choice problems were more difficult for the female than for the male. This may be because of their abstractness and therefore women are not so much interested in them. The Photographs present a different type of situation.

It was possible to get other data on the question of sex by making comparison of male, female and mixed groups when they were given all the time they wanted to solve a series of Multiple Choice Problems and also when a definite time limit was placed upon their actions. These results are shown in the second and third sections of the table. When the results

TABLE 2

Multiple Choice Problem

	MALE		FEMALE		MIXED	
	Time	Number of keys	Time	Number of keys	Time	Number of keys
Groups of 4 members using all 8 problems						
	seconds 599	86	*seconds* 466	98	*seconds* 655	106
Groups of 4 members working "ad lib"						
Series I	166	36	251	42	272	46
Series II	255	40	179	30	269	38
Average	210	38	215	36	270	42
Groups of 4 members working with a time limit						
Series I	181	32	61	25	177	32
Series II	185	46	132	31	231	50
Average	183	39	96	28	204	41
Groups of 3 members "ad lib"						
Series I	172	40	220	44		
Series II	200	45	231	55		
Average	186	43	225	49		
Groups of 6 members "ad lib"						
Series I	154	47	124	37		
Series II	162	57	227	47		
Average	158	52	175	42		

of both series are combined the males use 211 seconds and 38 keys, the females 259 seconds and 36 keys, and the mixed

groups 271 seconds and 42 keys. In the final analysis the males are quickest and are only slightly inferior in accuracy when compared with the females. The mixed groups are slower and less accurate than the others. These results corroborate the preceding results.

When we consider the results of similar groups when a definite time limit has been announced we find in combining the results of the two series that the male groups use 183 seconds and 39 keys, the females 96 seconds and 28 keys, the mixed groups 204 seconds and 41 keys. In this case also the females are quicker and more accurate. The mixed groups are not so efficient as in the "ad lib" results. The effect of practice in this type of material is only slight. The groups with practice do 16 per cent better but do not gain in accuracy. However, the practice effect was taken care of by the arrangement of groups as previously suggested so that it does not affect the results as just presented.

It was also possible to get data on groups composed of 3 members each and of 6 members each, using the two series of Multiple Choice Problems. These results are shown in the last two sections of table 2. When we group together Series I and Series II the groups of 3 males average 186 seconds and 43 keys while the groups of 3 females use 225 seconds and 49 keys. We can conclude that the female groups of this size are slightly inferior. In the case of the larger groups the males average 158 seconds and 52 keys, the females 175 seconds and 42 keys. These results indicate that the female groups of this size are 19 per cent more accurate than the male groups, but are 9 per cent slower. In summarizing the results on this type of material we may say that there is a rather marked sex difference. We should also consider that the size variable seems to be a factor. The type of material likewise has something to do with efficiency of the committee. These results show that the concrete and personal types of problem are solved more readily by females and that abstract and impersonal types are more easily solved by the males. The interests of the group and the way in which they attack the

problem must not be overlooked. It suggests the distinction that is sometimes made in the literature on sex differences

TABLE 3

Bridge Problems

	TIME		
	Male	Female	Mixed
Groups of 4 members working "ad lib"			
	seconds	*seconds*	*seconds*
Series I	924	863	1,099
Series II	924	783	138
Average	924	823	618
Groups of 4 members working with a time limit			
Series I	1,009	834	493
Series II	489	182	471
Average	749	458	482
Groups of 3 members working "ad lib"			
Series I	830	817	
Series II	659	792	
Average	744	754	
Groups of 6 members working "ad lib"			
Series I	426	1,385	
Series II	528	510	
Average	477	927	

between the interests of the two sexes,—the females taking greater interest in personal matters and the males in abstract.

The results for the third kind of material, Bridge Problems,

are shown in table 3. The first section gives the results for groups of 3 members each working without a time limit. When we average the results for these groups on both series the average for the males is 924 seconds, the females 823 seconds and the mixed groups 618 seconds. In this case the difference in behavior due to sex is fairly well marked. It would seem that mixed groups are more efficient than those of one sex.

The results of similar groups working under a time limit show that the males are the slowest of the three groups on both series. The female groups are slower on Series I than on Series II but when their results for both series are averaged they are faster than the males. The mixed groups are quicker than the male groups and only a little slower than the female groups. This bears out the conclusion from the previous tables in which were given findings for groups not working under a time limit.

Further data were collected on the question of sex using male and female groups of 3 members and of 6 members. In the case of the smaller groups working "ad lib" when the results of both Series I and Series II are combined the results favor the male groups with an average of 744 seconds against the female groups with an average of 754 seconds. For similar groups of 6 members each the males average 477 seconds, the females 947 seconds. The females take more time than the males and this tendency is more marked in the groups of 6 than in groups of 3.

If we disregard series, size of group, and time limit and compare male versus female groups we find the male groups average 705 seconds, the female groups 816 seconds. The male groups are 13 per cent more efficient than the females in solving such problems.

These results show that the male groups tend to be quicker in each case. When compared with female and mixed groups they are 14 per cent better. They are superior in groups of 3 and the only situation in which they seem at all inferior is in groups of 6 members.

Results for the Judgments of English Composition, the

fourth type of material used, are shown in table 4. Combining results of both series we find that in the case of the groups

TABLE 4

Judging English Compositions

	MALE		FEMALE		MIXED	
	Time	Accuracy	Time	Accuracy	Time	Accuracy
Groups of 4 members working "ad lib"						
	seconds		*seconds*		*seconds*	
Series I	1,141	0.62	967	0.69	1,130	0.56
Series II	1,113	0.70	831	0.65	1,154	0.69
Average	1,127	0.66	899	0.67	1,142	0.62
Groups of 4 members working with a time limit						
Series I	716	0.49	396	0.39	826	0.75
Series II	709	0.79	559	0.76	688	0.72
Average	712	0.64	477	0.57	757	0.73
Groups of 3 members working "ad lib"						
Series I	1,063	0.32	826	0.49		
Series II	688	0.61	625	0.59		
Average	875	0.46	725	0.54		
Groups of 6 members working "ad lib"						
Series I	1,718	0.64	1,361	0.4		
Series II	1,206	0.83	864	0.7		
Average	1,462	0.73	1,112	0.5		

of 4 members each working "ad lib" the male groups average 1127 seconds with 0.66, the female groups 899 seconds with 0.67, and the mixed 1142 seconds with 0.62. The female

groups are more accurate and quicker while the mixed groups are slower than either males and females and are the least accurate. It was possible to get data on similar groups with a definite time limit. In this case when Series I and Series II are combined we find the males have 712 seconds with an accuracy of 0.64, the females 477 seconds and 0.57, the mixed 752 seconds and 0.73. The females are the quickest and the least accurate while the mixed groups are slower and more accurate.

It was also possible to compare males and females in groups of 3 and groups of 6 members each (see table 4). In the case of the smaller groups when we average the results for both series the male groups average 875 seconds and 0.46, the female 725 seconds and 0.54. In both series as well as when the results are grouped the trend in both accuracy and speed is in favor of the female groups.

In groups of 6 members each the males use 1462 seconds and average 0.73 in accuracy; the female groups take 1112 seconds and 0.5 for accuracy. These results for groups of 6 agree with those for groups of 3 in speed but not to an equal degree in accuracy. Again it seems that the smaller groups are more accurate.

THE EFFECT OF TIME LIMIT ON COMMITTEE EFFICIENCY

Should a committee have a definite amount of time in which to solve its problem or should it operate without a time limit? Is it possible to speed up the actions of a group without seriously impairing its efficiency? The present section discusses experimental results dealing with these problems.

The same four types of materials, viz., Photographs Portraying Emotions, Multiple Choice Problems, Bridge Problems and English Compositions were used in this experiment. It was always necessary to use both Series I and Series II of the material. For instance, Series I would be given "ad lib," i.e., with no suggestion of a time limit, followed by Series II with a definite announced time limit, e.g., "You have 10 minutes in which to make these selections." The above order

was reversed for some groups, Series II being given "ad lib" followed by Series I with a time limit. It was necessary to have the "ad lib" series first for otherwise the first time limit series would give a set that would vitiate the subsequent "ad lib." The time limit used in each type of material was determined by preliminary experiments with several groups of subjects. The time selected for the subsequent experiments was a little less than the average time required by the preliminary groups.

In all cases three types of groups were used (*a*) groups of 4 males, (*b*) groups of 4 females and (*c*) groups consisting of 2 males and 2 females. In this section 136 males and 124 females were used. The results are shown in table 5.

The average time for the males on Series I "ad lib" is 190 seconds with 9 photographs correct, and on Series II with a time limit, the average is 112 seconds with an accuracy of 8. The female groups on Series I "ad lib" average 229 seconds with 8 photographs correct, and on Series II with a time limit, 184 seconds with 7 photographs correct. The mixed groups on Series I "ad lib" take 180 seconds and get 8 photographs correct while on Series II with definite time limit they require 127 seconds and get 9 photographs correct.

If we pool the results disregarding sex and consider all groups together, the groups on Series I "ad lib" take on the average 199 seconds with an accuracy of 8; while on Series II with a time limit they take 141 seconds with an accuracy of 8. They are thus about 30 per cent quicker and show no appreciable decrease in accuracy.

Now let us consider the results where the groups do Series II "ad lib" and Series I with a 5-minute time limit. These are shown in the second half of table 5. The male groups on Series II "ad lib" take 216 seconds and get 7 photographs correct and on Series I with time limit 144 seconds and get 8 photographs correct. The female groups on Series II "ad lib" take 322 seconds with 8 photographs correct while on Series I with time limit 124 seconds and get 7 photographs correct. The mixed groups on Series II "ad lib" average 273

seconds with an accuracy of 10 and on Series I with a time limit 121 seconds and 8 photographs correct. Considering all groups who performed these series in this order the average for the "ad lib" series is 270 seconds with 8 photographs correct while with the time limit the average is 129 seconds with an accuracy of 8. The two orders of the series corroborate one another in the superiority of the time limit method.

TABLE 5

Photographs Portraying Emotions

	SERIES I. "AD LIB"		SERIES II. TIME LIMIT	
	Time	Accuracy	Time	Accuracy
	seconds		*seconds*	
Male groups	190	9	112	8
Female groups	229	8	184	7
Mixed groups	180	8	127	9
Average	199	8	141	8
	SERIES II. "AD LIB"		SERIES I. TIME LIMIT	
Male groups	216	7	144	8
Female groups	322	8	124	7
Mixed groups	273	10	121	8
Average	270	8	129	7

When we disregard Series I and II of material and consider all the male groups we find the average on the "ad lib" to be 203 seconds with 8 correct; and on the time limit 128 seconds with 8 correct. The female groups average 275 seconds and get 8 correct working on the "ad lib" while with the time limit they average 154 seconds and get 7 correct. Here the time used is less and there is no appreciable decrease in efficiency. The mixed groups working "ad lib" average 226 seconds with an accuracy of 9 and under a time limit 124 seconds with 8 correct. These results are similar to those above.

Finally, if we consider all the groups working "ad lib" they take 235 seconds and get 8 photographs correct. Under time limit they take 135 seconds and get 8 photographs correct. In general with this material the groups work much faster under "fire" and without any decrease in efficiency. On the average they save about 42 per cent of the time. The females do not seem relatively quite so efficient under time limit as the males; however, the two change consistently in the same direction.

We find that the practice effect for photographs is 9 per cent in speed and 2 per cent in accuracy so if we subtract this 9 per cent from the foregoing time percentages we have a residue of 21 per cent for the women and 29 per cent for the men that can be attributed to the time limit instructions.

Let us now examine the results with the Multiple Choice Problems. The general plan of procedure was identical with that previously described and the same types of groups were used. These results are recorded in table 6. The males doing Series I "ad lib" average 166 seconds and 36 keys while doing Series II with a time limit they average 185 seconds and 46 keys. The female groups working in the same order use 251 seconds and 42 keys on Series I and 132 seconds and 31 keys on Series II. The mixed groups use 272 seconds and 46 keys on Series I while on Series II they use 231 seconds and 50 keys. The males with a time limit take more time and are less accurate, the females take less time and are more accurate while the mixed groups take slightly less time and are a little more accurate. This is one of the few cases when the "ad lib" group is superior to the time limit group. It probably represents a chance variation from the general trend. The trend shows best in the case of the females. When all the groups, male, female and mixed are considered together on Series I "ad lib" they average 229 seconds and 41 keys while when timed they use 182 seconds and 42 keys. These results favor the time limit. The limited groups are 20 per cent quicker and only slightly less accurate.

When we consider the groups doing Series II "ad lib" fol-

lowed by Series I timed the male groups require 255 seconds and 40 keys on Series II with 181 seconds and 32 keys on Series I; the females 179 seconds and 30 keys on Series II and 40 seconds and 17 keys on Series I; the mixed groups 264 seconds and 37 keys on the "ad lib" series and 148 seconds and 30 keys on the time limited series. This shows that all these groups are consistently superior in the timed series both from the standpoint of speed and accuracy.

TABLE 6

Multiple Choice Problems

	SERIES I. "AD LIB"		SERIES II. TIME LIMIT	
	Time	Accuracy	Time	Accuracy
	seconds		*seconds*	
Male groups	166	36	185	46
Female groups	251	42	132	31
Mixed groups	272	46	231	50
Average	229	41	182	42
	SERIES II. "AD LIB"		SERIES I. TIME LIMIT	
Male groups	255	40	181	32
Female groups	179	30	40	17
Mixed groups	264	37	148	30
Average	232	32	123	26

Let us see what happens when we consider the results of all groups working "ad lib" versus those with time limit. All the male groups on "ad lib" average 210 seconds and 38 keys. When they do problems with a time limit they average 183 seconds and 39 keys. The females average 215 seconds and 36 keys on the "ad lib" and 86 seconds and 24 keys when working under a time limit. The mixed groups average 268 seconds and 41 keys on "ad lib" series and 189 seconds and 40 keys on times series. Thus all these groups under a time limit work

much faster and there is only a slight decrease in efficiency which seems a little more marked in the male groups.

Finally considering all the groups together they average 293 seconds and 38 keys when they work "ad lib" and 152 seconds and 32 keys when they are timed. This shows an increase of 15 per cent in accuracy and an increase of 48 per cent in speed in favor of the group working under a time limit. The

TABLE 7

Bridge Problems

	TIME	
	Series I. "ad lib"	Series II. Time limit
	seconds	*seconds*
Male groups	924	489
Female groups	1,063	182
Mixed groups	1,099	471
Average	1,028	380
	Series II. "ad lib"	Series I. Time limit
Male groups	1,120	1,009
Female groups	783	834
Mixed groups	694	493
Average	865	788

practice effect with this material is 16 per cent leaving a 32 per cent increase in efficiency due to the time limit.

In the case of the Bridge Problems the general plan of procedure was the same as that which has been given for other problems. These results are given in table 7.

The male groups average 924 seconds on Series I "ad lib" and 489 seconds on Series II with a time limit; the female groups average 1063 seconds on the former and 182 seconds on the latter; the mixed 1099 seconds on the first and 471 seconds

on the second. Combining all three kinds of groups, the average on Series I "ad lib" is 1028 seconds and on Series II with a time limit is 380 seconds showing over 63 per cent increase in efficiency as measured by speed.

The male groups average 1120 seconds on Series II "ad lib" and 1009 seconds on Series I with a time limit. The female groups average 783 seconds on the former and 834 seconds on the latter while the mixed groups take 694 seconds on the first and 493 seconds on the second. The trend of the female groups is in the opposite direction from the other but the difference is rather small. Considering all groups together disregarding sex those doing the "ad lib" series average 865 seconds and those under time limit 788 seconds. This suggests again an increase in efficiency under a time limit. This tendency is clearer in the case of the male groups and the mixed groups.

Combining the results of all groups the males average 1022 seconds on the "ad lib" series and 749 seconds on the time limited series; the females 923 seconds on the former and 508 seconds on the latter; the mixed groups average 896 seconds on the first and 482 on the second. Thus in the groups when timed the males are 25 per cent more efficient; the females 44 per cent; and the mixed 46 per cent.

When we disregard sex and find the average we get 947 seconds on the "ad lib" series and 579 seconds for the time limit series. The groups on the time-limited series are 38 per cent more efficient. The practice effect in this type of material shows groups with practice to be 15 per cent quicker. This leaves a clear superiority of 23 per cent for the groups with a time limit. It seems quite clear that the committees doing such work as Bridge Problems are much more efficient working under a definite time limit.

The results for the Judgment of English Composition—the fourth type of material used—are shown in table 8. The general plan of procedure was the same as that used with the other three types of materials. It should be noted that accuracy was calculated in terms of coefficients of correlation

between the ratings made by the group and the Thorndike ratings of the compositions.

The male groups on Series I "ad lib" take 1114 seconds and have an accuracy of 0.4 while on Series II with a time limit of 15 minutes they average 708 seconds with an accuracy of 0.76. The females average 967 seconds and 0.69 on the former and 559 seconds and 0.76 on the latter. The mixed groups average 1130 seconds and 0.57 on the first and 688 seconds and 0.72

TABLE 8

Grading English Compositions

	SERIES I. "AD LIB"		SERIES II. TIME LIMIT	
	Time	Accuracy	Time	Accuracy
	seconds		*seconds*	
Male groups	1,114	0.4	708	0.76
Female groups	967	0.69	559	0.76
Mixed groups	1,130	0.57	688	0.72
Average	1,070	0.55	651	0.74
	SERIES II. "AD LIB"		SERIES I. TIME LIMIT	
Male groups	1,113	0.74	716	0.49
Female groups	831	0.65	644	0.69
Mixed groups	1,154	0.69	828	0.75
Average	1,032	0.69	729	0.64

on the second. When all three types of groups are considered together the average time on Series I "ad lib" is 1070 seconds with an accuracy of 0.55 and on Series II time limited is 651 seconds with an accuracy of 0.74. These groups show that when they are given a definite time limit they are quicker and more accurate. This seems more characteristic of the male groups.

The male groups doing Series II "ad lib" average 1113 seconds and score 0.74 in accuracy while on Series I with a

time limit they take 716 seconds and score 0.49 in accuracy. The females average 831 seconds in time and 0.65 in accuracy on the "ad lib" series and 644 seconds and 0.69 on the series with a time limit. The mixed groups average 1154 seconds and 0.69 on the "ad lib" series and 828 seconds and 0.75 on the series with a time limit. When the results for all three types of groups are pooled the average of the groups on the "ad lib" series is 1032 seconds and 0.69 in accuracy against 729 seconds and 0.64 on the series with a time limit. The time limited groups are only slightly less accurate but 29 per cent quicker than the "ad lib" groups. Thus the time limited groups are much more efficient.

Considering all the groups on "ad lib" series versus the series with a time limit the males average 1113 seconds and 0.54 on the "ad lib" series and 712 and 0.62 on the time limited series. The females average 894 seconds and have an accuracy score of 0.76 on the former and take 601 seconds and have an accuracy score of 0.72 on the latter. The mixed groups have an average time of 1142 seconds with 0.63 for accuracy on the first and 758 seconds time with 0.73 in accuracy on the second.

Combining all the groups an average of 1051 seconds is required with an accuracy of 0.62 for the "ad lib" series and an average of 690 seconds and an accuracy of 0.69 for the series with the time limit. Thus the timed groups are slightly more accurate and 34 per cent quicker.

The practice effect in the case of Judging English Compositions seems greater than in any of the other materials. Groups with practice are 22 per cent quicker and 23 per cent better in accuracy. This renders the foregoing results with the compositions somewhat less significant but it is still interesting to find their trend in the same direction as that for the other three types of material.

INTROVERTS AND EXTROVERTS ON COMMITTEES

Recent work in applied psychology is devoting considerable attention to the analysis of personality and temperament. Techniques are being perfected for the measurement of these

characteristics and we are discovering their importance in many practical situations, for instance, vocational adjustment. It occurred to the writer that these things might likewise play a rôle in committee efficiency. Committees may be composed of widely varying personalities or may be rather homogeneous. We stated above that a committee comprising members of both sexes was somewhat inferior. It is possible that homogeneity in personality or temperament should function similarly to homogeneity in sex in affecting committee efficiency. At any rate this seems a profitable field for further study. Limitation of time, however, made it possible to select only a minor phase of this large problem and study it in a preliminary way. The results are to be regarded as suggestive of the problem rather than as final conclusions. The experiments were devoted to a single personality variable that is being studied considerably of late, viz., introversion versus extroversion. Recent contributions to the study of this variable have been made by Freyd (6), Laird (7) and Heidbreder (8).

In selecting introvert and extrovert subjects for this experiment a questionnaire as prepared by Thompson (9) was used. It is a modified form of that originally developed by Laird. The directions and a few typical items are as follows:

DIRECTIONS

Answer the following questions regarding yourself by placing the number of the phrase that most accurately describes you in the small blank to the right of the question. In answering think back over your experience for the past few months and answer as accurately as you can. The answers to the questions are strictly confidential and will be used in no way for or against you. The only "right" answer is the most accurate one. Take as much time as you wish but be accurate. Select that phrase that most accurately describes you.

1. Are your friends and acquaintances limited? (1) to members of your family, (2) to a select few, (3) to a fairly large number, (4) all except those who are not respectable, (5) unlimited. ——

2. How often do you feel hurt? (1) sensitive to every remark, (2) sensitive to most remarks made in seriousness, (3) only to those remarks that are emphatic, (4) rarely, (5) never. ——

3. Do you study the motives of others? (1) seldom give them a thought, (2) occasionally consider them, (3) try to unmask important ones, (4) usually try to discover motives, (5) suspicious of most motives. ——

4. Do possible misfortunes disturb you? (1) worry about them, (2) usually think what might happen, (3) occasionally give them some thought, (4) pay little attention, (5) never bother me. ——

5. How do you act when things go wrong? (1) pity yourself much, (2) feel blue and complain, (3) feel blue but do not complain, (4) become somewhat excited, (5) don't care much. ——

The subject checked the one of the five items under each question which best described his own condition. The final score was determined by totaling the number of points checked, for instance no. 3; no. 5; no. 1, etc. The lowest score possible was 51 while the highest was 255. Individuals making high scores are classed as extroverts while those making low scores are introverts. The following four groups were used:

1. Four male introverts
2. Four female introverts
3. Four male extroverts
4. Four female extroverts

In selecting problems for these committees the Photographs Portraying Emotions and the Multiple Choice Problems were the materials used. These two represent the most extreme types of problem used in the previous experiments,—one being concrete and appealing to the personal interest and the other being distinctly abstract. It seemed probable that these would catch any prominent difference between introverts and extroverts in the type of material with which they will deal most effectively.

When we examine the results for the Multiple Choice Problems (table 9) we find the extrovert male group requires 925 seconds and 75 keys, the introvert males 416 seconds and 80 keys. The introvert males are 55 per cent quicker and 6 per cent less accurate. The Extrovert female group take 551

seconds and use 88 keys; the Introvert female group take 560 seconds and use 87 keys. The introvert females are 16 per cent slower and 1 per cent more accurate. When the male and female groups are combined the introverts are 33 per cent quicker and 2 per cent less accurate than the extroverts on this type of material.

We find that the group of 4 extrovert males in using the Photographs Portraying Emotions (see table 10) take in all 135 seconds with 12 photographs correct. On Series II this same group takes 164 seconds and get 9 photographs correct. When we average the results on both series they take 149

TABLE 9

Multiple Choice Problems

	TIME	ACCURACY
	seconds	
Extrovert male groups	925	75
Extrovert female groups	551	88
Average	738	81
Introvert male groups	416	80
Introvert female groups	560	87
Average	488	83

seconds and get 10+ photographs correct. With the Photographs Portraying Emotions the introvert males use on Series I 140 seconds and get 9 photographs correct while on Series II they take 235 seconds and get 6 correct. On the two Series they average 187 seconds with 7 photographs correct. The extrovert females on Series I use 63 seconds and get 12 photographs correct while on Series II they take 97 seconds with 12 correct. Combining their results on both Series they take 80 seconds and get 12 correct. The introvert females on Series I take 202 seconds with 8 correct; on Series II 122 seconds and 8 correct. On both series they average 162 seconds and 8 photo-

graphs correct. The extrovert females are 50 per cent quicker and 33 per cent more accurate than the introvert females.

When we combine all groups disregarding sex and series the extroverts take 114 seconds with 11 photographs correct

TABLE 10

Photographs Portraying Emotions

	TIME		ACCURACY	
	seconds			
Extrovert male groups:				
Series I	135		12	
Series II	164		9	
Average		149		10
Extrovert female groups:				
Series I	63		12	
Series II	97		12	
Average		80		12
Grand average, extrovert	114		11	
Introvert male groups:				
Series I	140		9	
Series II	235		6	
Average		187		7
Introvert female groups:				
Series I	202		8	
Series II	122		8	
Average		162		8
Grand average, introvert	199		7	

and the introverts 199 seconds with 7 correct. The extroverts are 42 per cent quicker and 45 per cent more accurate than the introverts. Findings with both types of material suggest that introversion and extroversion play a rôle in committee efficiency and are worthy of more intensive study.

SUMMARY AND CONCLUSIONS

The following general conclusions have been drawn from the data presented on each of the last three phases of this experiment on committee efficiency as discussed in this article:

Sex of committees

I. Experimental data show that a committee all of one sex is more efficient than a committee composed of both sexes. Mixed groups tend to get off the subject. This is especially true with a concrete and personal task.

II. The type of problem given the committee to solve also cuts across the sex variable.

1. In Interpreting Photographs Portraying Emotions the women do better than the men. The women seem to find this material of a personal type and seem very much interested in it. The men however do not seem so much interested, speed up and are more inaccurate.

2. In the Multiple Choice Problems the males are slower and more accurate than the females. This is an abstract type of material and the females are not so much interested in it, so they speed through and are inaccurate. On the other hand this abstract situation appeals to the men; they are more interested and do better.

3. With the Bridge Problems the females are quicker than the males and do not seem to differ in accuracy. They proceed in a less meticulous fashion.

4. In the case of the English Compositions the female groups are quicker and more accurate. This material seems of a personal and interesting type.

III. The sex variable is still further influenced by the size of the group.

1. The tendency for the females to be superior in judging the Photographs Portraying Emotions and in judging English Compositions and vice versa, is more marked with groups of 3 than with groups of 6. However, this tendency is present in both cases.

IV. A limited amount of time in which to act is another factor which differentiates sex groups. In most cases the time limit is less conducive to increased efficiency of female groups than of male groups.

Effect of time limit on committee efficiency

I. The experimental data of this discussion tends to show that with the four types of material the groups respond more quickly with the same, and in many cases greater, accuracy when they are given a definite time limit than when they work "ad lib." They do not tend to go into so many blind alleys.

II. The male groups show a slightly larger increase in speed and accuracy under a time limit than do female and mixed groups.

Introvert versus extrovert

I. With the four kinds of material there seems to be no general trend for introverts or extroverts to be superior on all types of problem.

II. Efficiency as far as introversion or extroversion is concerned depends largely on the type of problem to be solved.

III. In general extroverts are better on the concrete and personal type of problem. In this type, such as the Pictures Portraying Emotions, each individual comes to the problem with his own solution and it is a matter of the group convincing certain members that they are wrong. It may be that the introvert is not so effective in argument and avoids controversy. The introverts are distinctly better on the Multiple Choice Problem. There each member adds his part by helping check a theory and personally pre-conceived opinions do not enter. The foregoing conclusions are of course subject to the limitations imposed by the use of only four kinds of committee task and the use of college students as subjects. However, the tasks used ranged from the concrete and personal to the highly abstract and would seem to give as fair sample of committee action as could be obtained under laboratory conditions. Con-

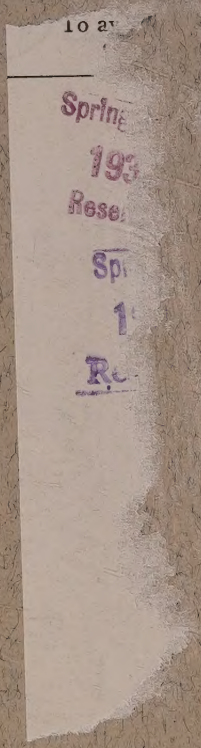
sequently, the writer is disposed to feel that the tendencies brought out in these experiments are of rather general applicability. Size, sex, personality and time limit all play their rôle in committee efficiency. Many other problems in this field of course await the experimental approach but the foregoing are at least suggestive. There is little doubt but that the selection and administration of committees along psychological lines would save the political, industrial and academic world a tremendous amount of unnecessary time and effort.

REFERENCES

(1) Feleky, A. M.: Emotions from photographs. Psychological Review, 1914, vol. 21, 33–41.
(2) Yerkes, R. M.: A new method of studying ideational behavior. Journal of Comparative Psychology, 1921, vol. 1, 369–394.
(3) Work, M. C.: Auction Bridge. John C. Winston Company, 1926, pp. 475.
(4) Thorndike, E. L.: English Compositions. 150 Specimens Arranged for Use in Psychological and Educational Experiments, Teachers College, 1916.
(5) South, E. B.: Some psychological aspects of committee work. Journal of Applied Psychology, 1927, vol. 11, 348–368.
(6) Freyd, Max: Introverts and extroverts. Psychological Review, 1924, vol. 31, 74–87.
(7) Laird, D. A.: How personalities are found in industry. Industrial Psychology, 1926, vol. 1, no. 10, 654–662.
(8) Heidbreder, E.: Measuring introversion and extroversion. Journal of Abnormal and Social Psychology, 1926, vol. 30, no. 2, 120–134.
(9) Thompson, L. A.: An experimental study of attitude toward work of different degrees of homogeneity. Unpublished Doctor's Dissertation. Ohio State University, 1927.

AUTOBIOGRAPHY

Earl Bennett South was born in Troy, Ohio, August 18, 1897. He received his secondary education in the public schools of Lost Creek Township and Troy, Ohio, graduating from High School in 1917. He received his undergraduate education at Ohio University, Athens, Ohio, graduating in 1921 with the degree of Bachelor of Science in Education. During his senior year at Ohio University he was a student instructor in Paidology and Psychology. He pursued graduate work at the University of Chicago in the summer of 1921. He was an Instructor in Psychology at Ohio University from 1921 to 1924 and an Assistant Professor in 1924–1925. In 1923 he received the degree of Master of Arts from the Ohio State University. He was an Instructor in the Department of Psychology at Ohio State University 1925–1927. During these two years he pursued work in the Graduate School in this Institution and received the degree of Doctor of Philosophy in June, 1927.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